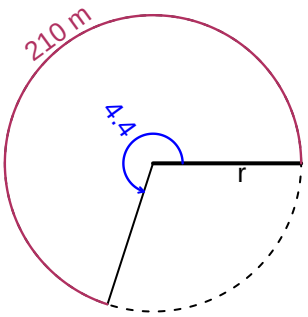
Name: Date:

# Trig Final (SLTN v665)

- You can use a calculator (like Desmos)
- You should have a unit-circle with special angles and coordinates marked.

### Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 4.4 radians. The arc length is 210 meters. How long is the radius in meters?

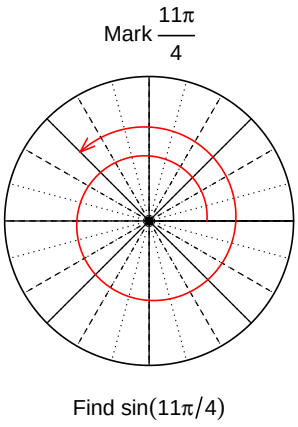



$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

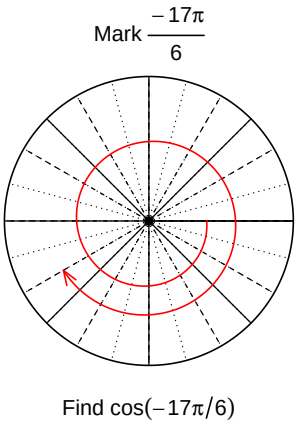
$r = 47.73$ meters.

### Question 2

Consider angles $\frac{11\pi}{4}$ and $\frac{-17\pi}{6}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{11\pi}{4}\right)$ and $\cos\left(\frac{-17\pi}{6}\right)$ by using a unit circle (provided separately).




Find $\sin(11\pi/4)$




Find $\cos(-17\pi/6)$

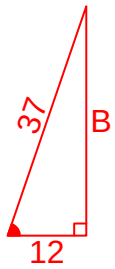
$\sin(11\pi/4) = \frac{\sqrt{2}}{2}$

$\cos(-17\pi/6) = \frac{-\sqrt{3}}{2}$

**Question 3**

If $\cos(\theta) = \frac{-12}{37}$, and $\theta$ is in quadrant III, determine an exact value for $\sin(\theta)$.

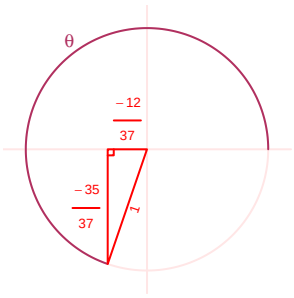
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.




Solve the Pythagorean Equation

$$12^2 + B^2 = 37^2$$
$$B = \sqrt{37^2 - 12^2}$$
$$B = 35$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.




$$\sin(\theta) = \frac{-35}{37}$$

**Question 4**

A mass-spring system oscillates vertically with a midline at $y = 3.56$ meters, a frequency of 2.42 Hz, and an amplitude of 6.95 meters. At $t = 0$, the mass is at the minimum height. Write an equation to model the height ($y$ in meters) as a function of time ($t$ in seconds).

Any of these equations would get full credit.

$$y = -6.95\cos(2\pi 2.42t) + 3.56$$

or

$$y = -6.95\cos(4.84\pi t) + 3.56$$

or

$$y = -6.95\cos(15.21t) + 3.56$$